



The impact of meteorological parameters on urban air quality

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Abstract:

Previous studies have shown that global climate change will have a significant impact on both regional and urban air quality. As air temperatures continue to rise and mid-latitude cyclone frequencies decrease, the overall air quality is expected to degrade. Climate models are currently predicting an increased frequency of record setting heat and drought for Oklahoma during the summer months. A statistical analysis was thus performed on ozone and meteorological data to evaluate the potential effect of increasing surface temperatures and stagnation patterns on urban air quality in the Oklahoma City Metropolitan area. Compared to the climatological normal, the years 2011 and 2012 were exceptionally warm and dry, and were therefore used as case study years for determining the impact of hot, dry conditions on air quality. These results were then compared to cooler, wetter summers to show how urban air quality is affected by a change in meteorological parameters. It was found that an increase in summertime heat and a decrease in summertime precipitation will lead to a substantial increase in both the minimum and maximum ozone concentrations as well as an increase in the total number of exceedance days. During the hotter, drier years, the number of days with ozone concentrations above the legal regulatory limit increased nearly threefold. The length of time in which humans and crops are exposed to these unsafe levels was also doubled. Furthermore, a significant increase was noted in the overnight minimum ozone concentrations. This in turn can lead to significant, adverse affects on both health and agriculture statewide.

Source: <http://dx.doi.org/10.1016/j.atmosenv.2013.12.006>

Resource Description

Exposure : ☒

weather or climate related pathway by which climate change affects health

Air Pollution, Extreme Weather Event, Food/Water Security, Precipitation, Solar Radiation, Temperature

Air Pollution: Interaction with Temperature, Ozone

Extreme Weather Event: Drought

Food/Water Security: Agricultural Productivity

Temperature: Extreme Heat, Fluctuations

Geographic Feature: ☒

resource focuses on specific type of geography

Climate Change and Human Health Literature Portal

None or Unspecified

Geographic Location:

resource focuses on specific location

United States

Health Impact:

specification of health effect or disease related to climate change exposure

Morbidity/Mortality, Respiratory Effect, Other Health Impact

Other Health Impact: Hospitalizations

Population of Concern: A focus of content

Population of Concern:

populations at particular risk or vulnerability to climate change impacts

Children, Elderly

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified